

CLAIMS

What is claimed is:

1 38. A system for collision avoidance in formation flight, the system on a first aircraft, the system

2 comprising:

3 a. data link transponder means for receiving broadcast data from a second aircraft, the 350
4 broadcast data comprising indicia of position of the second aircraft;

5 b. navigation means for providing indicia of current position of the first aircraft; 330

6 c. means for determining relative aircraft position of the first and second aircraft in 350
7 accordance with the indicia of position of the second aircraft and the indicia of the current
8 position of the first aircraft; 410

9 d. means for generating a steering command to maintain separation between the first
10 aircraft and the second aircraft in accordance with relative aircraft position of the first and
11 second aircraft; and 380

12 e. means for transmitting the steering command to the second aircraft.

1 39. The system of claim 38 wherein the transponder means receives the broadcast data via a
2 Mode-S data link.

1 40. The system of claim 38 wherein the transponder means receives automatic dependent
2 surveillance broadcast data comprising the broadcast data.

1 41. The system of claim 38 wherein the transponder means receives extended squitter comprising
2 the broadcast data.

1 42. The system of claim 38 wherein:

2 a. the navigation means comprises a global positioning system; and 330

3 b. the navigation means provides the indicia of current position in accordance with an
4 output of the global positioning system.

1 43. The system of claim 38 wherein the means for determining relative aircraft position 350
2 comprises a computer of a traffic alert and collision avoidance system.

1 44. The system of claim 43 wherein the traffic alert and collision avoidance system determines
2 relative aircraft position without transmitting traffic interrogations.

1 45. The system of claim 44 wherein the traffic interrogations comprise air traffic control radar 9
2 beacon systems messages.

1 46. The system of claim 43 wherein the traffic alert and collision avoidance system determines
2 relative aircraft position while operating in a passive surveillance TCAS mode.

1 47. The system of claim 38 wherein:

2 a. the means for determining relative aircraft position comprises a computer of a traffic
3 alert and collision avoidance system; and

4 b. the means for generating steering commands comprises a mission computer coupled
5 to the computer of the traffic alert and collision avoidance system.

1 48. The system of claim 38 wherein the steering command is transmitted in a message
2 comprising an address of a formation cell leader.

1 49. The system of claim 38 wherein the steering command is transmitted on a first link to the cell
2 leader for dissemination by the cell leader via a second link that is independent of the first link.

1 50. The system of claim 49 wherein the second link comprises a station keeping system digital
2 datalink.

1 51. The system of claim 38 wherein:

2 a. the system further comprises tracking means for maintaining the relative positions of
3 a plurality of cells;

4 b. the means for generating, in response to the tracking means, generates a plurality of
5 steering commands to accomplish maintaining the relative positions of the plurality of cells; and

6 c. the means for transmitting transmits the plurality of steering commands by addressing
7 selected steering commands of the plurality of steering commands to a respective cell leader of
8 each cell of the plurality of cells.

1 52. The system of claim 51 wherein addressing to a respective cell leader is in accordance with at
2 least one of a Mode-S address and a flight identifier.